TELEDYNE CONTINENTAL® AIRCRAFT ENGINE

service bulletin

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TO: Distributors, Dealers, Aircraft Engine Overhaul Facilities, Owners and Operators of Teledyne Continental Motors Aircraft Engines

SUBJECT: **EXHAUST GAS TEMPERATURE (E.G.T.) RECOMMENDATIONS FOR STANDARD ENGINES**

The proper use of E.G.T. for assisting the operator with fuel management and as a diagnostic tool is considered by Teledyne Continental Motors as acceptable and often times desirable. The following is prepared as an instructional aid, (when specific airframe manufacturers instructions are not available) to assure that when such equipment is installed, it is properly used.

A. Take-off and climb power settings are normally performed at full rich mixture to enhance cylinder cooling compensating for limited available cooling air flow. The exception to this rule is in those cases where fuel systems are not adequately compensated for altitude. Some leaning is then permissible but only to avoid engine roughness or power loss while still keeping the fuel flow within rich limits.

B. For cruise power settings, leaning is recommended to obtain optimum aircraft range at powers of approximately 75% or less. ***Best Power*** can be defined as that mixture setting that results in maximum indicated air speed, and which produces E.G.T. values from 100 to 150 degrees F. rich of peak at a given M.P. and R.P.M. Additional gains can be realized with fuel management below best power from the standpoint of fuel economy and extended aircraft range. This is the leaning area of most interest to the manufacturer and operator.

Exhaust Temperature Sensing Equipment

Various types of equipment are available today and differ somewhat in their characteristics. The most significant difference appears to be whether they are sensing temperature in the exhaust system at one location (single point) or at several locations (multiple point). ***When specific installation instructions are not available from the airframe manufacturer, install E.G.T. systems in conformance with the following recommendations:***

A. ***Single Point E.G.T.*** This unit is primarily useful for fuel management only and the location of the sensor in the exhaust system is of importance relative to recommended operational values of E.G.T.

In general, the probe should be located in the exhaust of the leanest cylinder and approximately three inches from the cylinder exhaust flange.

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If the unit is located in the exhaust system sensing multiple cylinders, operation further from peak is required to avoid any one cylinder running too lean. This factor is of importance only on naturally aspirated engines (especially those with carburetor fuel systems).

If more specific instructions on this point are not available from the aircraft owners manual, a further enrichment of 25 degrees F. for a probe sensing multiple cylinders over a probe installed in the leanest cylinder is advisable.

For carburetor equipped engines, the exhaust gas temperature probe should be located in the exhaust stack of the leanest cylinder as determined with maximum cruise power at an altitude of 5000 feet or above. This must be established in the particular airframe installation.

B. ***Multiple Point E.G.T.*** This equipment has the advantage of performing engine diagnostic functions as well as being as asset in fuel management. It is often referred to as an engine analyzer.

1. For fuel management, a reference position should be established and used for adjustments of fuel at cruise conditions. **Do not** pick the cylinder that indicates the hottest E.G.T. at a given fuel flow; rather, by leaning progressively pick the ***reference cylinder*** as that one which reaches peak E.G.T. at the greatest fuel flow.

2. Cylinder malfunction can best be detected by an indication of a significant change in the normal temperature pattern between cylinders.

Guidelines for Fuel Management Using E.G.T.

In specific installations where aircraft manufacturers have provided specific instructions, those instructions should be followed.

A. ***Take-off and Climb Power Settings.*** On normally aspirated engines, use full rich mixture. Lean only to avoid engine roughness or noticeable power loss, at elevated fields. Remember that a turbocharged engine is an altitude compensated engine, and can achieve full sea level power up to a very high critical altitude. Therefore, the mixture must be full rich at full throttle up to critical altitude.

B. ***Maximum Cruise. (Approximately 75% Power).*** For economy of fuel and extended range, do not lean the mixture below 50 degress F. rich of peak. Note: All turbocharged engines are limited to 1650 degrees F. or 1750 degrees F. maximum Turbine Inlet Temperature (T.I.T.) Peak T.I.T. operation is allowed for 60 seconds to determine peak T.I.T.

C. ***Economy Cruise. (Approximately 65% Power or Lower).*** Lean out to peak E.G.T. is approved at these low power settings as the value of peak E.G.T. is below that which is allowed at the corresponding propeller load maximum cruise power point at 50 degrees F. rich of peak E.G.T.

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Remember, use of exhaust gas temperature indicators to monitor fuel mixture settings is recommended only at maximum cruise power settings and below. Mixture settings must be re-established for any change in altitude or power settings.

NOTE: If doubts arise as to correct operation of engine, an operator's manual for every model engine is available from TCM Publications Department, P.O. Box 90, Mobile, Alabama 36601 or call (205) 438-3411, Ext. 298.